MARKET POTENTIAL FOR A NEW OPTICAL STORAGE PRODUCT

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MARKET POTENTIAL FOR A NEW OPTICAL STORAGE PRODUCT

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MARKET POTENTIAL FOR A NEW OPTICAL STORAGE PRODUCT

ABSTRACT

This report contains a long-range forecast of the worldwide markets for a new and, as yet, unannounced optical storage product. In addition to the forecasts, a number of issues are evaluated from a customer perspective including applications for the product, price sensitivity and attitudes concerning the competitive environment.

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February 1981

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1 INTRODUCTION

1

I INTRODUCTION

A. STUDY OBJECTIVES

- The objectives of this study were to:

  - Dimension the worldwide market for the optical storage product (OSP) over the period 1982-1990 in four sectors:

    . Very large IBM and PCM sites, characterized by having the equivalent of at least multiple 168s.

    . Large IBM and PCM sites, characterized by having a CPU ranging from a single 158 to a single 168 or equivalent.

    . Intermediate IBM and PCM sites, characterized by having the equivalent of a 4300 series CPU.

    . Non-IBM compatible sites, including systems from DEC, Burroughs, Univac, NCR, CDC, Honeywell, ICL, Siemens, Fujitsu, Hitachi, etc. having power comparable to all the IBM sectors listed above.

  - Forecast OSP penetration over the period 1982-1990 in terms of units per CPU.

- Provide Storage Technology Corporation (STC) with recommendations relating to OSP technical and marketing requirements.

B. STUDY METHODOLOGY

- The primary research vehicle was a series of in-depth telephone interviews conducted with knowledgeable users in each of the four sectors.

- Before the interviews took place, INPUT prepared a description of the OSP (that was opproved by STC) which was sent to prospective interviewees in order to familiarize them with the product concept, specifications and pricing. This document is contained in Appendix A.

  - One hundred sixteen interview prospects were contacted and sent the descriptive documents after agreeing to cooperate in the interview at a later date.

  - For the statistics presented in this study, data from 47 interviews were included. Subsequent to the analysis, several additional interviews were completed. Pertinent qualitative data from these additional interviews were incorporated into the study report.

  - The interview sample upon which the study data results are based is given in Exhibit I-1.

  - The interview questionnaire was developed jointly between INPUT and STC. A copy of the questionnaire is given in Appendix B.

- Forecasts of U.S. CPU populations in the four sectors were developed from existing INPUT data that covered the period through 1985. These data were extended through 1990 by extrapolation based on the judgement of the INPUT staff.

EXHIBIT I-1

INTERVIEW SAMPLE UPON WHICH
STUDY RESULTS ARE BASED

SECTOR	NUMBER OF INTERVIEWS
VERY LARGE	16
LARGE	14
INTERMEDIATE	10
NON-IBM	7
TOTAL	47

- Forecasts of worldwide CPU populations were developed by applying factors relating the worldwide installed base to the U.S. base data. These factors were derived from existing INPUT data and changed over the forecast period.

- The penetration of OSP into the CPU installed base over the forecast period was derived from the interview data coupled with considerable judgement on the part of the INPUT senior staff. Influencing this judgement was a set of assumptions defined in the next section.

- The small-system market represented by products sold by IBM/GSD, Hewlett-Packard, DEC, etc. was specifically excluded from the study. INPUT believes that, long term, this sector could be a substantial business opportunity for OSP.

C. MARKET PROJECTIONS: ASSUMPTIONS

- In order to make a rational forecast of the market for OSP, a number of unknown factors and scenarios were presumed. These are briefly described in this section.

I. BASIC ASSUMPTIONS

- The installed base average annual growth rates for the four sectors over the 1982-1990 period were forecast as follows:

-	Very large	16%
-	Large	11%
-	Intermediate	11%
-	Non-IBM	12%

- Rotating storage capacity is forecast to grow at 65% annually for all CPU categories through 1985.

- Optical storage products and the new applications that will become feasible with new technology will increase the storage capacity forecast growth rate to 75% annually for the 1986-1990 time period.

- Despite growth in capacity, continuing cost/performance improvement in both magnetic and optical technologies will cause the value of installed storage per CPU to remain essentially constant through 1990.

- It is assumed that vendors will sell as actively overseas as they do in the U.S. Therefore, international and U.S. forecasts have the same number of drives per CPU and the penetration rate will also be coincidental.

2. ASSUMED SCENARIOS

- STC announces an OSP in 1982.
  - OSP is plug compatible with existing 3350 or 3380 type disks.
  - Customer must use STC storage control unit, 38301I type.
  - Spindle is mapped as four or one volumes per optical disk.
  - Standard IBM software is used.
- At least 50% of the available market is responsive to a non-IBM OSP.
  - A few sites place large orders: 20+ spindles.
  - Many orders for two spindles come from STC customer base.
- STC announces OSP in 1982 as an OEM product.

- Targets are:
  - . Minicomputer manufacturers.
  - . Software and system integration companies.
  - . Word processing vendors.

- OSPs announced in 1982 by companies not now strong in disk technology.
  - Products are aimed at OEM market, not IBM plug compatible.

- STC ships disk-compatible OSP in late 1983.
  - There is a minimum media shelf life of seven years at first customer shipment.
  - Large sites compete for Beta systems.

- IBM announces OSP in late 1983.
  - IBM OSP has its own characteristics - not disk or tape compatible.

- STC announces an OSP compatible with IBM's within 60 days of IBM's announcement.

- Other plug compatible storage vendors announce IBM compatible OSPs 90 days or more after IBM announcement.

- Other mainframe manufacturers (BUNCH + DEC) announce an OSP in 1983.
  - Announced first customer shipment will be in late 1984 and 1985.

- STC ramps up production during 1984.

- STC ships evaluation units to OEMs during 1984.

- IBM first customer shipment made in the fourth quarter of 1984.
- STC makes volume shipments throughout 1985.
- IBM ramps up production during 1985.
- Other plug compatible manufacturers ship IBM compatible product beginning in 1986.
- IBM hits volume production level in 1986.
- By 1986, optical storage is accepted as the bridge product between rotating magnetic storage and magnetic tape.
- Jukebox products available by 1987.
- Faster, high density OSPs available beginning 1987-1988.

II EXECUTIVE SUMMARY

II EXECUTIVE SUMMARY

A. MARKET GROWTH

- As shown in Exhibit II-1, over 380,000 OSPs will be installed worldwide by 1990 in the four sectors examined. INPUT believes that there will be substantial other markets for the product which were not addressed in this study. These include:

  - The small-system market, including minis, small business computers, word processors, certain types of communications processors and message switches.

  - The turnkey systems market for any application requiring large file retrieval capabilities.

  - Image processing systems.

- While not investigated, INPUT estimates that these markets could add another 100,000 to 250,000 units to the 1990 installed base forecast.

- In the four sectors covered, shipments are expected to exceed 127,000 units per year by 1990, as shown in Exhibit II-2.

EXHIBIT II-1

FORECAST OF OSP UNITS INSTALLED WORLDWIDE

SECTOR	1983	1984	1985	1986	1987	1988	1989	1990
IBM & PCM VERY LARGE	102	1,733	6,670	17,100	33,680	72,470	126,630	194,040
IBM & PCM LARGE	73	1,055	3,000	7,500	18,230	26,440	41,775	55,000
IBM & PCM INTERMEDIATE	-	1,270	5,100	11,040	20,000	31,590	47,150	70,000
OTHER MAINFRAMES	-	125	1,350	5,300	11,430	21,040	38,700	62,220
TOTAL	175	4,183	16,120	40,940	83,340	151,540	254,255	381,260

EXHIBIT II-2

FORECAST OF OSP UNIT SHIPMENTS WORLDWIDE

SECTOR	1983	1984	1985	1986	1987	1988	1989	1990
IBM & PCM VERY LARGE	102	1,631	4,937	10,430	16,580	38,790	54,160	67,410
IBM & PCM LARGE	73	982	1,945	4,500	10,730	8,210	15,335	13,225
IBM & PCM INTERMEDIATE	-	1,270	3,830	5,940	8,960	11,590	15,560	22,850
OTHER MAINFRAMES	-	125	1,225	3,950	6,130	9,610	17,660	23,520
TOTAL	175	4,008	11,937	24,820	42,400	68,200	102,715	127,005

INPUT

- As shown in Exhibit III-3, 51% of these units will be installed in the very large sector.

  - Other mainframe market sectors are roughly the same size (16% each).

- At an average selling price of $25,000 to $30,000 per unit (spindle), the four sectors represent a potential of installed value of roughly $10 billion by 1990.

- INPUT found that several very large users would install 50+ units within two years of product introduction.

  - Possible limiting factors in the early years are production capacity and IBM entry.

  - When IBM announces an OSP, other vendors will be able to deal more effectively with the perceived compatibility issue which is the primary barrier to early user acceptance.

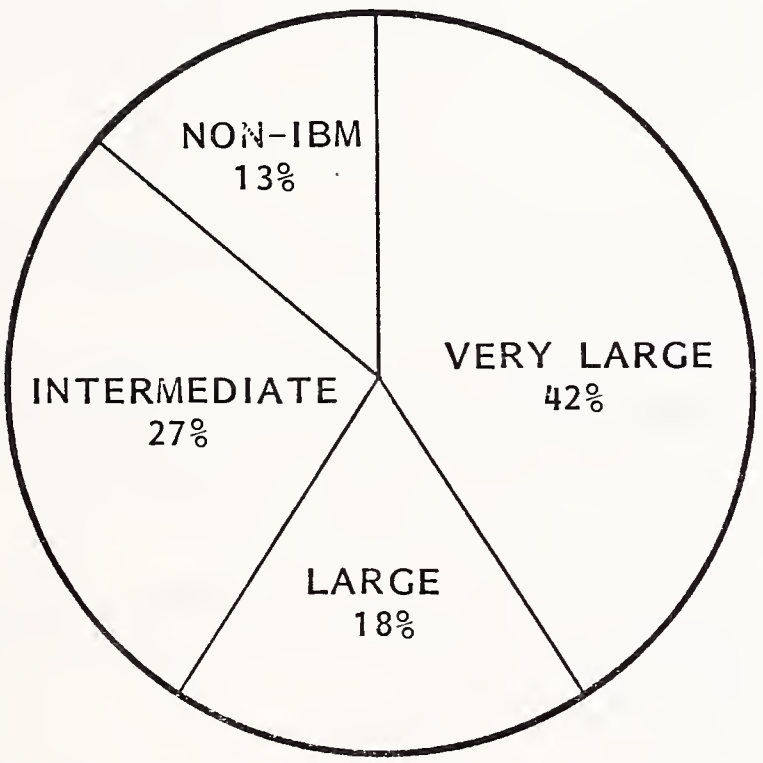
B. OTHER CONCLUSIONS

- User reaction to the OSP was extremely positive. None of the people surveyed in this study were disinterested. As expected, strong interest was evidenced by the very large sector which is the primary target market.

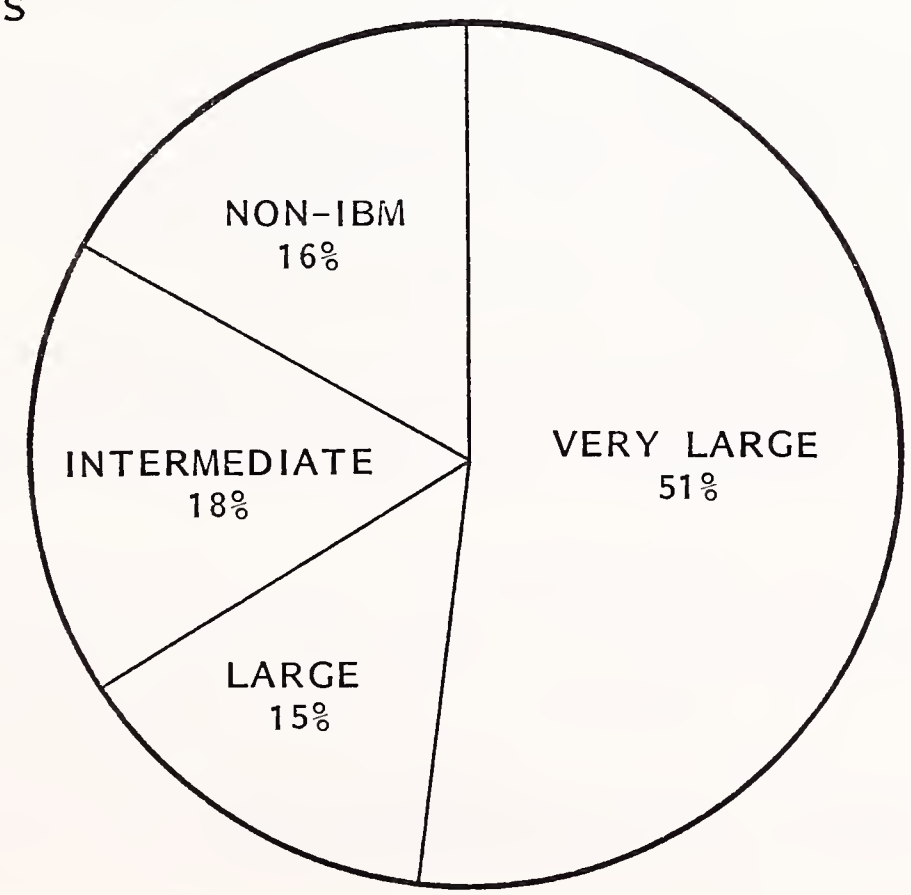
- The jukebox concept received a warm reception from many potential customers. If offered as a complementary product, it will enhance OSP sales in some areas. Several people surveyed saw it as the ideal replacement for large tape libraries.

EXHIBIT II-3

WORLDWIDE OSP MARKET DISTRIBUTION -
INSTALLED BASE



1986
41,000 UNITS



1990
381,000 UNITS

- Non-erasibility was, surprisingly, the least important performance parameter and would not appear to be a major limitation of the OSP.

  - Parameters such as storage density and access time are far more important.

  - The physical size of the OSP was an attrative feature to many very large users.

- A media shelf life of 10 years will meet the majority of users' requirements.

  - Insurance companies and banks want a 15-year life in order to comply with legal requirements. If technology improvements can produce long-lived optical media, sales potential will be higher than forecast.

- Although several vendors are known to be working on an OSP, no significant EDP vendor appears to have a jump on the market.

  - STC was mentioned second only to IBM as the most acceptable OSP vendor.

- Early in the product cycle, price will not be a major issue. Long term, users will expect the same kind of price/performance improvements they have experienced with magnetic disks.

- Several users immediately perceived their initial applications for OSP. The principal applications mentioned, in descending order of importance, were:

  - Disk backup.

  - Archives.

  - On-line tape library.

- Large historical data bases.

- Inquiry only data bases.

C. RECOMMENDATIONS

I. MARKET

- STC should move as quickly as possible to introduce an OSP.

- The first product should be plug compatible with existing IBM disk storage products.

- Initial sales efforts should focus on the very large IBM sector.

- The sales campaign should anticipate that early prospects will attempt to make direct comparisons with disk technology.

  - A crisp, logical story relating to price/performance will be required, coupled with ability to demonstrate the OSP's usefulness as a new rather than a replacement device.

- Any approach made to prospects for a turnkey system configuration should be defined in terms of applications. STC will need to develop an in-house applications capability or form joint ventures with systems houses to succeed at the end user level.

  - If this is not done, the turnkey market should be considered an OEM from STC's point of view.

- Sales potential for OSP will be enhanced by the availability of a jukebox.

- Users' biggest fears are centered on the software issue; they are primarily concerned that the device may not ultimately be IBM compatible. The marketing strategy needs to focus on the solution to this potential barrier to product acceptance.

- As a strategy, INPUT recommends that STC consider offering ancillary services to assist users in converting existing libraries and files to OSP.

  - One or more joint ventures with service bureaus are a rational possibility.

- Prospects interested in using OSP for new applications rather than as a disk/tape replacement should receive sales priority. It will be an easier sell.

2. PRODUCT

- When used in a peripheral configuration, the OSP must appear logically as a conventional disk or tape drive to the operating system.

  - This is particularly true early in the product cycle prior to an IBM announcement.

- STC should strive to develop long-lived media.

- If technology permits, consider developing a fixed media device with higher density and fast access time. This device would be eminently suitable for applications requiring large "living" historic files.

- INPUT recommends offering only a read/write (R/W) device at product entry.

  - Early users will buy only read/write anyway.

  - Revenue per unit will be double that of read/only (R/O) devices.

- Consider offering a dual (or even more) spindle unit early in the product cycle.
  - The first customers will be very large users who will want to buy multiple devices anyway.
  - Floor space saving is an attractive feature to very large users.
  - More profit per spindle can probably be obtained if cost savings can be made in cabinetry, power supplies, etc.
- If special software is required, operation in the MVS environment should be sufficient early in the program.

III MARKET ANALYSIS AND FORECAST

III MARKET ANALYSIS AND FORECAST

A. THE VERY LARGE IBM AND PCM SECTOR

- The market forecast is given in Exhibit III-1.
- This segment is expected to be STC's primary target, particularly at the beginning of the program.
- The average number of drives per CPU will build steadily in this segment as new large-file oriented applications are developed.
- Some users indicated they could use as many as 50 OSPs, although the 50 units would necessarily be shared by multiple CPUs in most cases.
- The large number of drives per CPU in this segment will result in this segment having half of the installed drives in 1990.

B. THE LARGE IBM AND PCM SECTOR

- The market forecast is given in Exhibit III-2.

EXHIBIT III-1

OSP UNIT FORECAST:

VERY LARGE IBM AND PCM SECTOR

	1982	1983	1984	1985	1986	1987	1988	1989	1990
U.S. MARKET									
NUMBER OF CPUs INSTALLED	3,125	3,625	4,175	4,750	5,375	5,950	6,600	7,300	8,000
PERCENT PENETRATION BY OSP	0%	1%	8%	20%	35%	50%	70%	85%	95%
NUMBER OF CPUs PENETRATED	0	30	335	950	1,881	2,975	4,620	6,205	7,600
AVERAGE OSP DRIVES/CPU	-	2	3	4	5	6	8	10	12
DRIVES INSTALLED	-	60	1,005	3,800	9,405	17,850	36,960	62,050	91,200
DRIVES SHIPPED	-	60	945	2,795	5,605	8,445	19,110	25,090	29,150
U.S. AS PERCENT OF WORLDWIDE INSTALLED	60%	59%	58%	57%	55%	53%	51%	49%	47%
WORLDWIDE MARKET									
DRIVES INSTALLED	-	102	1,733	6,670	17,100	33,680	72,470	126,630	194,040
DRIVES SHIPPED	-	102	1,631	4,937	10,430	16,580	38,790	54,160	67,410

EXHIBIT III-2

OSP UNIT FORECAST:
LARGE IBM AND PCM SECTOR

	1982	1983	1984	1985	1986	1987	1988	1989	1990
U.S. MARKET									
NUMBER OF CPUs INSTALLED	3,875	4,175	4,525	4,850	5,225	5,550	5,900	6,300	6,740
PERCENT PENETRATION BY OSP	0%	0.5%	5%	11%	24%	45%	60%	75%	90%
NUMBER OF CPUs PENETRATED	0	20	225	510	1,250	2,500	3,550	4,700	6,050
AVERAGE OSP DRIVES/CPU	-	2	2.5	3	3	3.5	3.5	4	4
DRIVES INSTALLED	-	40	560	1,530	3,750	8,750	12,425	18,800	24,200
DRIVES SHIPPED	-	40	520	970	2,220	5,000	3,675	6,375	5,400
U.S. AS PERCENT OF WORLDWIDE INSTALLED	57%	55%	53%	51%	50%	48%	47%	45%	44%
WORLDWIDE MARKET									
DRIVES INSTALLED	-	73	1,055	3,000	7,500	18,230	26,440	41,775	55,000
DRIVES SHIPPED	-	73	982	1,945	4,500	10,730	8,210	15,335	13,225

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- Since this sector tends to be very cost conscious, OSPs will most often be used as replacement for installed disks or tapes.

- This is the slowest growing CPU segment, but it cannot be ignored because many of these users will eventually migrate to become the very large users of the future.

C. THE INTERMEDIATE IBM AND PCM SECTOR

- The market forecast is given in Exhibit III-3.

- This sector will take the most selling effort and most service cost because of the low ratio of peripherals to CPUs.

- An appropriate strategy for this sector may be to concentrate on specific industries and offer a combined hardware/software product.

D. THE NON-IBM SECTOR

- The market forecast is given in Exhibit III-4.

- This sector is very diverse, with no vendor having more than 7% of the total CPU market.

- While not offering storage products with identical specifications as IBM, they do provide products in roughly the same size and price/performance ranges.

- Therefore, if IBM offers an OSP, it is very likely that these vendors will eventually offer a similar product.

EXHIBIT III-3

OSP UNIT FORECAST:

INTERMEDIATE IBM AND PCM SECTOR

	1982	1983	1984	1985	1986	1987	1988	1989	1990
U.S. MARKET									
NUMBER OF CPUs INSTALLED	14,000	15,400	17,000	18,700	20,500	22,300	24,000	26,000	28,000
PERCENT PENETRATION BY OSP	-	-	3%	9%	16%	24%	32%	40%	50%
NUMBER OF CPUs PENETRATED	-	-	510	1,700	3,300	5,400	7,700	10,400	14,000
AVERAGE OSP DRIVES/CPU	-	-	1.3	1.5	1.6	1.7	1.8	1.9	2.0
DRIVES INSTALLED	-	-	660	2,550	5,300	9,200	13,900	19,800	28,000
DRIVES SHIPPED	-	-	660	1,890	2,750	3,900	4,700	5,900	8,200
U.S. AS PERCENT OF WORLDWIDE INSTALLED	56%	54%	52%	50%	48%	46%	44%	42%	40%
WORLDWIDE MARKET									
DRIVES INSTALLED	-	-	1,270	5,100	11,040	20,000	31,590	47,150	70,000
DRIVES SHIPPED	-	-	1,270	3,830	5,940	8,960	11,590	15,560	22,850

EXHIBIT III-4

OSP UNIT FORECAST:

NON-IBM LARGE AND INTERMEDIATE SECTOR

	1982	1983	1984	1985	1986	1987	1988	1989	1990
U.S. MARKET									
NUMBER OF CPUs INSTALLED	5,500	5,950	6,500	7,025	7,650	8,275	9,040	9,875	10,750
PERCENT PENETRATION BY OSP	0%	0%	0%	5%	15%	25%	35%	50%	65%
NUMBER OF CPUs PENETRATED	0	0	40	350	1,150	2,070	3,160	4,940	7,000
AVERAGE OSP DRIVES/CPU	-	-	1.7	2.0	2.3	2.7	3.2	3.6	4
DRIVES INSTALLED	-	-	68	700	2,650	5,600	10,100	17,800	28,000
DRIVES SHIPPED	-	-	68	632	1,950	2,950	4,500	7,700	10,200
U.S. AS PERCENT OF WORLDWIDE INSTALLED	58%	56%	54%	52%	50%	49%	48%	46%	45%
WORLDWIDE MARKET									
DRIVES INSTALLED	-	-	125	1,350	5,300	11,430	21,040	38,700	62,220
DRIVES SHIPPED	-	-	125	1,225	3,950	6,130	9,610	17,660	23,520

INPUT

- In a very limited way, some users of DEC, Univac and CDC CPUs can attach IBM compatible drives or subsystems. This could allow STC to sell a few OSPs in this market without selling OEM to the manufacturer.

  - Expect some users (e.g., the federal government) to ask for a system that will work with both IBM and one of the other mainframes.

- Since several of the manufacturers are known to be working on their own OSPs, this sector will not likely be a prime OEM market. Obviously, since there are only a few customers, the amount of potential business will be dependent on a very few contracts.

E. U.S. SUMMARY

- For reference, a summary of the U.S. market is given in Exhibits III-5 (Units installed) and III-6 (Unit shipments).

EXHIBIT III-5

FORECAST OF OSP UNITS INSTALLED-
U.S. ONLY

SECTOR	1983	1984	1985	1986	1987	1988	1989	1990
IBM & PCM VERY LARGE	60	1,005	3,800	9,405	17,850	36,960	62,050	91,200
IBM & PCM LARGE	40	560	1,530	3,750	8,750	12,425	18,800	24,200
IBM & PCM INTERMEDIATE	-	660	2,550	5,300	9,200	13,900	19,800	28,000
NON-IBM	-	68	700	2,650	5,600	10,100	17,800	28,000
TOTAL	100	2,293	8,580	21,105	41,400	73,385	118,450	171,400

EXHIBIT III-6

FORECAST OF OSP UNIT SHIPMENTS-
U.S. ONLY

SECTOR	1983	1984	1985	1986	1987	1988	1989	1990
IBM & PCM VERY LARGE	60	945	2,795	5,605	8,445	19,110	25,090	29,150
IBM & PCM LARGE	40	520	970	2,220	5,000	3,675	6,375	5,400
IBM & PCM INTERMEDIATE	-	660	1,890	2,750	3,900	4,700	5,900	8,200
NON-IBM	-	68	632	1,950	2,950	4,500	7,700	10,200
TOTAL	100	2,193	6,287	12,525	20,295	31,985	45,065	52,950

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IV ANALYSIS OF USER RESPONSES

IV ANALYSIS OF USER RESPONSES

A. REACTION TO OSP

1. GENERAL

- As shown in Exhibit IV-1, 75% of the respondents were more than slightly interested in OSP.

  - As expected, 93% of the very large users were interested. This group has a broad range of applications for which the OSP appears to be ideally suited.

  - INPUT found at least two respondents in this sector who were ready to buy OSP in quantity had it been available.

  - Not one respondent was disinterested in the concept.

2. TURNKEY

- Respondents were asked to quantify, on a relative basis, their potential use of OSP as a peripheral device as opposed to its use in a standalone "turnkey" information retrieval system.

  - Answers to this question are summarized in Exhibit IV-2. However, INPUT does not believe these data are conclusive.

EXHIBIT IV-1

INITIAL REACTION
TO OSP CONCEPT

SECTOR	LEVEL OF INTEREST (PERCENT OF RESPONDENTS)			
	VERY	MODERATE	SLIGHTLY	NEUTRAL
VERY LARGE	31%	62%	-	7%
LARGE	36	29	29%	7
INTERMEDIATE	20	40	30	20
NON-IBM	44	28	28	-
ALL	32%	43%	19%	6%

NO RESPONDENT INDICATED "NOT INTERESTED"

NUMBER OF RESPONDENTS = 47

EXHIBIT IV-2

USAGE OF TURNKEY OSP
RELATIVE TO TOTAL OSP USAGE

SECTOR	NUMBER OF RESPONSES			ESTIMATED AVERAGE* TURNKEY USE (PERCENT)
	YES	NO	MAYBE	
VERY LARGE	3	11	2	10%
LARGE	5	4	5	10
INTERMEDIATE	1	4	5	10
NON-IBM	1	5	1	10
TOTAL	10	24	13	N/A

*DATA NOT CONCLUSIVE. ESTIMATES REPRESENT INPUT'S JUDGEMENT.

. The respondents were not, in general, thinking in terms of independent large file retrieval systems.

. The system description of the turnkey product provided by STC was not sufficient to provide an in-depth understanding of its power. Turnkey systems need to be addressed in a specific applications conflict.

- In an earlier study, "Turnkey System Opportunities, 1979-1984," INPUT forecast the U.S. market for turnkey systems to reach 279,000 units shipped in 1984, as shown in Exhibit IV-3.

  - Even if growth rates taper off substantially, at least a million systems will be shipped in 1990 in the U.S., and possibly as many as 2.5 million systems worldwide.

  - If the OSP captured only a 5% share of the turnkey systems market by 1990, the shipment rate would be 125,000 units in that year. The 5% estimate is probably conservative given that significant price/performance improvements will be available by that time.

- When asked what applications were perceived as being suited for an OSP-based turnkey system, some of the users did have immediate applications in mind. A list of the applications mentioned and the frequency of mentions is given in Exhibit IV-4.

3. JUKEBOX

- As shown in Exhibit IV-5, two-thirds of the respondents were interested in the "jukebox."

  - Many thought it would reduce manpower.

  - The major application would be for reducing or replacing tape libraries.

EXHIBIT IV-3

MARKET FORECAST FOR TURNKEY SYSTEMS
BY SYSTEM COMPONENT,
1979-1984

SYSTEM COMPONENT	1979 ($ BILLION)	1984 ($ BILLION)	AVERAGE ANNUAL GROWTH RATE 1979-1984 (PERCENT)
HARDWARE	$2.4	$ 8.9	30%
SOFTWARE	1.1	7.1	45
SERVICE	0.6	2.8	35
TOTAL	$4.1	$18.8	35%
SYSTEMS SHIPPED	61,000	279, 00	35%

EXHIBIT IV-4

APPLICATIONS MENTIONED
FOR TURNKEY PRODUCT

APPLICATION	NUMBER OF MENTIONS
ARCHIVAL STORAGE	6
LIBRARY, INFORMATION RETRIEVAL	3
ERISA DATA	1
CENSUS DATA	1
TEXT PROCESSING	1
CREDIT FILES	1
CHECK TRANSACTIONS (BANK)	1
SEISMIC DATA	2
NUCLEAR DATA	1
LEGAL DECISION FILE	1

EXHIBIT IV-5

INTEREST IN JUKEBOX
AS REPORTED BY RESPONDENTS

SECTOR	NUMBER OF MENTIONS		
	YES	NO	MAYBE
VERY LARGE	10	5	-
LARGE	7	5	-
INTERMEDIATE	4	3	1
NON-IBM	4	2	1
TOTAL	25	15	2

- About one-third of the respondents perceived its applicability in new applications such as image processing.

- STC had described the jukebox to INPUT as a "mechanical monster." This piece of information was not given to the interviewees who, in nearly all cases, did not perceive any inherent reliability problems. Their reactions would undoubtedly have been different if they had thought the product might be unreliable.

  - Positive and negative comments made by respondents during the interviews are given in Exhibits IV-6 and IV-7.

- Surprisingly, most of the respondents foresaw using the jukebox for existing applications, the primary one being a replacement for large tape libraries, as shown in Exhibit IV-8.

- Exhibit IV-9 contains a list of new applications mentioned by respondents.

B. PERFORMANCE PARAMETERS

- Respondents were asked to rate the relative importance of various OSP performance parameters. The results of this evaluation are shown in Exhibit IV-10 and are given by market sector.

- These data were reduced by assigning a nominal value of "1" to the lowest rated parameter so that the relative value of other parameters could easily be deduced. The data are given in Exhibit IV-11.

  - Clearly, storage density is the most important parameter, followed by access time. The importance of these parameters is, of course, tied directly to the application for which the device will be used. The

EXHIBIT IV-6

TYPICAL POSITIVE COMMENTS ABOUT JUKEBOX

- "LOWER UNIT COST"
- "CAN FIT ENTIRE LIBRARY ON 15 PLATTERS"
- "I BELIEVE I CAN REPLACE OUR TAPE LIBRARY"
- "UNATTENDED DATA BACKUP"
- "WILL SAVE MONEY ON OPERATIONS" (SEVERAL)
- "RAPID ACCESS TO GREAT AMOUNTS OF DATA"
- "CUT DOWN THE NUMBER OF BOXES"
- "SUBSTITUTE FOR MICROFILM"
- "RATHER BUY ONE UNIT THAN MULTIPLE SPINDLES"

EXHIBIT IV-7

TYPICAL NEGATIVE COMMENTS ABOUT JUKEBOX

- "TOO SLOW"
- "DON'T NEED THAT MUCH"
- "RELIABILITY"
- "POOR MAN'S MSS"

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EXHIBIT IV-8

JUKEBOX USAGE

SECTOR	NUMBER OF MENTIONS	
	FOR NEW APPLICATIONS	TO REPLACE EXISTING DEVICES
VERY LARGE	5	9
LARGE	3	6
INTERMEDIATE	3	6
NON-IBM	1	4
TOTAL	12	25

NUMBER OF RESPONDENTS = 47

EXHIBIT IV-9

NEW APPLICATIONS FOR JUKEBOX
MENTIONED BY RESPONDENTS

- CHECK DATA STORAGE
- NEW ARCHIVES (SEVERAL)
- TEXT PROCESSING
- ELECTRONIC FILING
- DISASTER RECOVERY
- TAPE REPLACEMENT
- MICROFILM IMAGE PROCESSING

INF

EXHIBIT IV-10

RESPONDENT RATINGS OF
OSP PERFORMANCE PARAMETERS

PARAMETER	RATINGS ON A SCALE OF 1-10				
	OVERALL	VERY LARGE	LARGE	INT.	NON-IBM
STORAGE DENSITY	8.3	8.7	8.2	8.1	8.1
ACCESS TIME	7.2	7.6	7.0	7.6	6.4
MEDIA PRICE	6.9	7.2	6.7	7.7	6.0
SYSTEM PRICE	6.8	7.2	6.2	7.7	5.8
REMOVABILITY	6.8	7.1	6.8	6.4	7.0
TRANSFER RATE	6.7	7.6	5.8	7.2	6.1
FUTURE PROSPECTS	6.6	7.1	6.5	7.1	6.6
PHYSICAL SIZE	6.3	7.4	5.7	6.0	5.5
NON-ERASABLE	4.9	4.8	5.9	4.4	4.1

NUMBER OF RESPONDENTS = 47

EXHIBIT IV-11

RELATIVE IMPORTANCE OF
PERFORMANCE PARAMETERS: ALL SECTORS

PARAMETER	RATING*
STORAGE DENSITY	1.7
ACCESS TIME	1.5
MEDIA PRICE	1.4
SYSTEM PRICE	1.4
REMOVABILITY	1.4
TRANSFER RATE	1.4
FUTURE PROSPECTS	1.3
PHYSICAL SIZE	1.3
NON-ERASABLE	1.0

*1 = LEAST IMPORTANT

importance of these two parameters as seen by respondents in an applications context is illustrated dramatically in Exhibit IV-12.

. Note that the major application is "Disk backup" and that it is here that transfer rate and access time are key.

- It is interesting to note that cost considerations - for both the device and the media - are rated in the middle of the importance scale. This reflects the fact that users are really not able to compare OSP price/performance apples-to-apples with disk or tape.

- Perhaps the most startling conclusion from the survey is that non-erasability is not a significant barrier to user acceptance of the product.

C. IMPACT OF OSP ON EXISTING FACILITIES

- Users were asked to evaluate the impact of OSP on future acquisitions of CPUs and storage devices. The responses were inconclusive. However, some general qualitative comments, based on interviewers' insights are as follows:

  - The OSP is generally understood as a complementary product to tape and disk, not as a replacement.

  - Some users did consider using OSP for disk backup, implying tape replacement. However, this will be a long-term phenomenon because the conversion effort will not be economic in the short term.

  - Most users perceived the OSP as an evolutionary disk type product. As such, some users thought that OSP would have a negative impact on 3330 and 3350 products.

EXHIBIT IV-12

APPLICATION RATINGS

APPLICATION	IMPORTANCE (ON A 0-10 SCALE; 10 = VERY IMPORTANT)	DEGREE OF CRITICALITY OF PERFORMANCE PARAMETER*	
		TRANSFER RATE	ACCESS TIME
1. DATA BASE			
a. Very large historical data bases. (History data written once and retained for subsequent access.)	5.5	2.2	2.2
b. Inquiry only/periodically updated data bases. (Summary files kept for specific periods of time.)	5.3	2.5	2.3
c. Inactive or non-updated partition of a data base. (History segment kept on optical, active update segment on magnetic disk.)	4.4	1.5	1.9
d. Sparsely populated randomized data bases. (Interspersed free space for update.)	2.5	1.7	1.8
e. Add-on data bases. (Add new records to end of data base such as data entry file.)	3.9	2.2	2.0
f. Versions of data bases. (Versions such as each month-end closing.)	4.9	2.1	1.8
g. Audit trail data bases. (Maintain previous data and add new data.)	4.1	1.9	1.8
h. Central library. (Central service library that many "subscribers" access.)	4.0	2.4	2.5
i. Protected data base. (Data base needing protection from update.)	4.2	2.0	2.1

*ON A SCALE OF 1-3.

IN

EXHIBIT IV-12 (CONT.)

APPLICATION RATINGS

	APPLICATION	IMPORTANCE (ON A 0-10 SCALE; 10 = VERY IMPORTANT)	DEGREE OF CRITICALITY OF PERFORMANCE PARAMETER*	
			TRANSFER RATE	ACCESS TIME
2.	• ON-LINE TAPE LIBRARY (Storage of sequential data that would normally be on tape.)	5.9	2.3	2.1
3.	• READ ONLY LIBRARY (Reference data such as program libraries.)	4.4	2.3	2.3
4.	• BACKUP (Disk backup data or duplicate copies.)	8.0	2.6	2.4
5.	• ARCHIVE (Data no longer needed for access but needing to be retained for legal or other reasons.)	6.4	1.9	1.8
6.	• CONTROLLED SPACE MANAGEMENT (Assign user controlled units of storage: unit of storage is re-written in its entirety whenever an update is made within that unit.)	3.8	2.2	1.9
7.	• BACKSTORAGE (Managed backstorage with automatic mounting of optical disks.)	3.9.	1.9	1.8
8.	• MICROFILM REPLACEMENT/IMAGE PROCESSING (Optical disk storage for output to CRT for requested display.)	4.2	2.1	2.0
9.	• JOURNALING	4.2	2.2	2.3

* ON A SCALE OF 1-3.

- However, many felt that OSP would have a positive impact on 3380 devices. The thinking was that conversion to OSP would stimulate concurrent conversion of all storage.

- In summary, there will likely be some negative impact on existing tape and disk device acquisition, but the impact will not be significant until late in the forecast period.

- Respondents generally felt that with OSP, consumption of tape reels and removable disk packs would diminish to some degree. This evidence supports the conclusion that OSP will negatively impact removable media 3330 type drives.

D. MEDIA SHELF LIFE

- Respondents were asked to state their shelf life requirements for media. As shown in Exhibit IV-13, most stated that 10 years would be sufficient.

  - However, more than 40% of the very large sector wants more than a 10-year shelf life. The statistic was heavily influenced by banks and insurance companies who have a 15-year life need for some data (based upon legal requirements).

E. COMPETITIVE ENVIRONMENT

- Forty to fifty percent of IBM users said that IBM's presence in the market with an optical storage device would have an impact on their acceptance of the concept.

EXHIBIT IV-13

MEDIA SHELF LIFE REQUIREMENTS
REPORTED BY RESPONDENTS

SECTOR	PERCENTAGE* OF RESPONDENTS			
	<5 YEARS	5-7 YEARS	8-10 YEARS	>10 YEARS
VERY LARGE	20%	30%	10%	40%
LARGE	10	50	30	10
INTERMEDIATE	-	50	30	20
NON-IBM	10	10	30	50

*ROUNDED TO NEAREST 10%

- The primary reason is fear of software incompatibility or potential lack of support for a non-IBM product.

- STC was mentioned as second only to IBM as a viable supplier of OSP, as shown in Exhibit IV-14.

- INPUT received indications, although no specific information, that at least one vendor is actively negotiating for test sites for an OSP. Interviewees were asked to state which firms they believed would offer an OSP in the near future. The responses are shown in Exhibit IV-15.

- The replies to the question of what vendor characteristics are required to be a credible OSP supplier are given in Exhibit IV-16.

  - Most important, was the requirement that the OSP vendor be an established EDP vendor. This means that companies such as Exxon or Xerox who are basically office system suppliers are not likely to be received well in the EDP enviroment.

- INPUT has learned that the following significant EDP vendors are working on OSP:

  - CDC (CPI).

  - MEMOREX.

  - IBM.

  - Univac.

  - Burroughs.

EXHIBIT IV-14

VENDORS MENTIONED AS HAVING REQUIRED CHARACTERISTICS

VENDOR	NUMBER OF MENTIONS
IBM	31
STC	19
AMDAHL	14
MEMOREX	11
CDC	10
BURROUGHS	5
NCR	4
UNIVAC	4
XEROX	4
OTHERS (ONE EACH)	14

EXHIBIT IV-15

MENTIONS OF COMPETITORS
EXPECTED TO OFFER OSP

VENDOR	NUMBER OF MENTIONS
IBM	4
MEMOREX	2
STC	1
TOSHIBA	1
CDC	1
PHILIPS	1
RCA	1

EXHIBIT IV-16

VENDOR CHARACTERISTICS REQUIRED FOR PURCHASER TO CONSIDER OSP

CHARACTERISTIC	NUMBER OF MENTIONS
ESTABLISHED EDP VENDOR	41
PROVEN FIELD SUPPORT	42
REPUTATION AS INNOVATOR	16
MUST BE A MAINFRAMER	2
PREVIOUS SUPPLIER	4

NUMBER OF RESPONDENTS = 47

F. PRICE SENSITIVITY

1. DRIVES

- Exhibit IV-17 shows the responses to the drive price sensitivity question.

  - INPUT feels that the data are inconclusive. However, relative to the 3380 at $.80/MB/month, most responses fall in the 25% to 75% range.

  - As noted earlier, the performance characteristics of the OSP are so different from conventional disk technology that users are not able, in most cases, to measure the differences directly.

- The fact that there are really no substantial differences in the responses between R/O and R/W devices is significant. As a strategy, it undoubtedly makes sense to offer only a R/W device initially. This conclusion is further supported by the responses to the question dealing with purchase distribution between R/O and R/W devices illustrated in Exhibit IV-18.

  - Further, INPUT believes that because of competitive and technology advances, all units will eventually be R/W.

- Interviewees were asked why they set the ceiling prices for drives that they cited. Responses are summarized in Exhibit IV-19.

  - It was obvious from the interviewees' reactions that most of these reasons were gut level rather than considered opinions.

2. MEDIA

- As shown in Exhibit IV-20, media use would drop off sharply at a price in excess of $75/platter.

EXHIBIT IV-17

OSP PRICE SENSITIVITY CEILINGS MENTIONED BY RESPONDENTS AS PERCENT OF 3380 DISK PRICE*

SECTOR	NUMBER OF MENTIONS							
	10-24%		25-49%		50-75%		76-100%	
	R/O	R/W	R/O	R/W	R/O	R/W	R/O	R/W
VERY LARGE	4	2	3	5	–	2	1	–
LARGE	–	–	4	1	1	3	1	2
INTERMEDIATE	1	1	1	2	3	4	–	1
NON-IBM	1	–	3	1	–	4	2	–
TOTAL	6	3	11	9	4	13	4	3

*ASSUME $.80/MB/MONTH

EXHIBIT IV-18

DISTRIBUTION OF READ/WRITE TO READ/ONLY OSP DEVICES
AS REPORTED BY RESPONDENTS

SECTOR	PERCENT OF R/W DEVICES*		
	INITIALLY	AFTER ONE YEAR	AFTER TWO YEARS
VERY LARGE	70%	70%	60%
LARGE	80	70	60
INTERMEDIATE	70	70	60
NON-IBM	90	70	70

*ROUNDED TO NEAREST 10%
NUMBER OF RESPONDENTS = 47

INP

EXHIBIT IV-19

REASONS CITED FOR PRICE CEILINGS

REASONS CITED	NUMBER OF MENTIONS
COST OF OSP AND DATA CONVERSION UNECONOMIC	11
THINK SOMEONE WILL HAVE CHEAPER OSP	11
APPLICATION DOESN'T JUSTIFY IT	0
JUST AS SOON STAY WITH DISK AT THAT PRICE	17
WRITE ONCE FEATURE TOO RESTRICTED	2
EXPECT OTHER MASS STORAGE TECHNOLOGIES	3
TOTAL	44

TOTAL RESPONDENTS = 47

EXHIBIT IV-20

MEDIA PRICE SENSITIVITY
PERCENT OF RESPONDENTS PERCEIVING A
SIGNIFICANT CHANGE IN USE
AS A FUNCTION OF PRICE

SECTOR	$25		$75		$100		$150	
	INC.	DEC	INC.	DEC	INC.	DEC	INC.	DEC
VERY LARGE	60%	-	20%	20%	10%	60%	-	80%
LARGE	40	-	-	-	-	40	-	60
INTERMEDIATE	30	-	10	20	-	40	-	60
NON-IBM	50	-	-	-	-	-	-	80

NOTE: PERCENTAGES ROUNDED TO NEAREST 10%

- It should be noted that users were "set up" in the interview because a nominal price of $50/platter was cited in the system description.

APPENDIX A: SYSTEM DESCRIPTION

OPTICAL STORAGE PRODUCT (OSP)
SYSTEM DESCRIPTION

I. GENERAL

This paper describes a planned new storage product based on optical technology.

The product offers, on removable and low-cost media, storage at a price one-third that of magnetic disk (at today's rates) - about $.30/MB/month.

The media is a 14" diameter removable platter expected to sell for approximately $40-50. Each platter can contain 4.0 Gigabytes (2.0 GB per side). Platter shelf life is 10 years. It contains the equivalent of 40 reels of 6250 BPI tape.

The device is contained in a unit approximately the same physical size as a 3370 and has approximately the same power and air requirements. Since a single spindle unit offers over three times the capacity of a 3380 disk or six times 3370 disk, floor space requirements for on-line storage would be one-sixth that of 3370 type disk drives for an equivalent number of megabytes.

The optical platter can be written on only once, but read as many times as desired. Thus, the product is ideally suited to read-only applications such as archival storage, and offers significant benefits to those applications requiring a high degree of data security.

Seek time is highly dependent on the length of the seek. For long seeks typical of random operation, the average access time would be 75 ms. For short seeks typical of sequential operation (less than five tracks), access time would be less than 2 ms.

The transfer rate of the OSP is 2.2 MB/sec. This compares with the rate achieved by state-of-the-art magnetic disks of 3MB/sec.

Two OSP devices would be offered:

- The first, which will sell for $48,000, has the capability to both read and write.

- The second, which will sell for $24,000, can read only.

II. APPLICATIONS

The vendor has postulated a list of applications which it believes are especially suited to the OSP. These are listed as follows:

- Data Base
  - Very large historical data bases.
    History data written once and retained for subsequent access.
  - Inquiry only/periodically updated data bases.
    Summary files kept specific periods of time.
  - Inactive or non-update partition of a data base.
    History segment kept on optical, active update segment on magnetic disk.
  - Sparsely populated randomized data bases.
    Interspersed free space for update.
  - Add-on data bases.
    Add new records to end of data base such as data entry file.
  - Versions of data bases.
    Versions such as each month end closing.
  - Audit trail data bases.
    Maintain previous data and add new data.
  - Central library.
    Central service library that many "subscribers" access.
  - Protected data base.
    Data base needing protection from update.
- On-line tape library
  Storage of sequential data that would normally be on tape.
- Read only library.
  Reference data such as program libraries.
- Backup.
  Disk backup data or duplicate copies.
- Archive.
  Data no longer needed for access but needing to be retained for legal or other reasons.

- Controlled space management.
  Assign user controlled units of storage: a unit of storage is rewritten in its entirety whenever an update is made within that unit.

- Backstorage.
  Managed backstorage with automatic mounting of optical disks.

- Microfilm replacement/image processing.
  Optical disk storage for output to CRT for requested display.

- Journaling

III. SOFTWARE SUPPORT ALTERNATIVES

There are a variety of software support or system alternatives the vendor could choose to provide with the OSP. These are:

1. To make it appear logically as an IBM-compatible tape drive.

2. To make it appear logically as an IBM-compatible disk drive.

3. To provide unique device support on IBM-compatible systems that take full advantage of the device characteristics, i.e., support of tape-like sequential and disk-like random processing.

4. Application-driven system: Under this concept, the vendor would provide a self contained system capable of implementing a specific application or group of applications in a standalone mode. It can be thought of as a turnkey information retrieval system providing access to and storage of very large files. The system could also be connected to other systems of any size via hardwire or telecommunications links.

   For example, the system could be used to support text processing applications, small business applications requiring large file access, directory inquiry services and the like.

IV. ARCHIVE LIBRARY CONCEPT

Within two years following the establishment of the OSP, the vendor will offer a "jukebox" type device providing automatic mount/dismount of platters.

The device would have a 500-platter capacity and a price tag in the neighborhood of $125,000, excluding associated drives.

Mounting or dismounting operations would occur within 10 seconds of a CPU command.

V. THE FUTURE OF OPTICAL STORAGE TECHNOLOGY

The vendor expects that the optical storage tehcnology will continue to develop with price-performance improvements being made at at least the same rate as has historically been achieved with magnetic technology.

APPENDIX B: QUESTIONNAIRE

1. Please indicate your initial reaction to the OSP described in the "System Description" document:

   _____ Extremely interested

   _____ Moderately interested

   _____ Slightly interested

   _____ Neutral

   _____ Not interested

   _____ Opposed

2. How would you rate the importance of the following OSP performance characteristics? (On a scale of 0-10, 10 being very important)

Characteristic	Rating
a. Storage density	_____
b. Access time	_____
c. Transfer rate	_____
d. Physical size	_____
e. Removability	_____
f. Non-erasable feature	_____
g. System price	_____
h. Media price	_____
i. Future prospects for product improvement	_____
j. Other(describe) _____	_____

_____

_____

3. If the OSP were purchased by your organization, would it reduce your tape or disk drive requirements?

TAPE: _____ Yes DISK: _____ Yes

_____ No _____ No

a. If yes, please indicate the percentage of tape or disk drives at your installation that would be subject to replacement by the OSP.

	TAPE	DISK
0 - 10%	_____	_____
11 - 25%	_____	_____
26 - 50%	_____	_____
51 - 100%	_____	_____

4. Can you foresee uses in your corporation for the standalone application-driven system previously described?

_____ Yes

_____ No

_____ Maybe

a. If yes or maybe, please estimate the percentage of OSPs that would be used in this configuration as opposed to it being used as a system peripheral.

_____ 0 - 25%

_____ 21 - 50%

_____ 51 - 75%

_____ 76 - 100%

b. If yes or maybe, please describe the applications you have in mind.

_____

_____

_____

5. Please complete the following chart comparing your current configuration to what it would be in two years with or without the availability of the Optical Storage Product.

	Current		In 2 years without optical		In 2 years with optical	
	Number	Vendor/ Model #	Number	Vendor/ Model #	Number	Vendor/ Model #
CPU	____	____	____	____	____	____
DISK	____	____	____	____	____	____
TAPE	____	____	____	____	____	____
MASS STORAGE SYSTEM	____	____	____	____	____	____
OSP TURNKEY	NA	NA	NA	NA	____	NA

6. Assuming you were to purchase the OSP, please estimate what the percentage of read/write and read only OSP devices would be.

	Read/Write		Read only	
Initally	____ %	+	____ %	= 100%
One year after installation	____ %	+	____ %	= 100%
Three years after installation	____ %	+	____ %	= 100%

7.a. How many tape reels are in your current library? _____

b. How many removable disk packs are in your current library? _____

c. Would the future acquisition of these be reduced by the use of optical storage?

_____ Yes

_____ No

If yes:

Tape reels: _____% reduction in future purchases.

Disk reels: _____% reduction in future purchases.

8.a. The vendor forsees the OSP at an end user price of $24,000 for a read only device and $48,000 for a read/write device. At what price would you cease to consider purchasing the product?

Read only device $ _____ or _____% of Disk/Tape price

Read/write device $ _____ or _____% of Disk/Tape price

b. Please indicate why you would no longer consider purchasing the product at this price.

_____ The cost of the equipment.

_____ Expect that competitors will have a similar product at lower cost. (Please indicate who: _____)

_____ At this differential would rather stay with conventional disk and tape.

_____ Other (please describe): _____

_____

_____

_____

9. What is your requirement for achival media in number of years of shelf life?

_____ less than 5 years

_____ 5 - 7 years

_____ 8 - 10 years

_____ more than 10 years

10. Please rate the importance of the following applications to your facility and indicate how critical the performance parameters indicated are to them.

Application	Importance (On a 0-10 scale 10 = very important)	Degree of criticality of performance parameter	
		Transfer Rate	Access Time
		H M L	H M L
1. DATA BASE			
a. Very large historical data bases. (History data written once and retained for subsequent access.)	_____	☐ ☐ ☐	☐ ☐ ☐
b. Inquiry only/periodically updated data bases. (Summary files kept specific periods of time.)	_____	☐ ☐ ☐	☐ ☐ ☐
c. Inactive or non-update partition of a data base. (History segment kept on optical, active update segment on magnetic disk.)	_____	☐ ☐ ☐	☐ ☐ ☐
d. Sparsely populated randomized data bases. (Interspersed free space for update.)	_____	☐ ☐ ☐	☐ ☐ ☐
e. Add-on data bases. (Add new records to end of data base such as data entry file.)	_____	☐ ☐ ☐	☐ ☐ ☐
f. Versions of data bases. (Versions such as each month end closing.)	_____	☐ ☐ ☐	☐ ☐ ☐
g. Audit trail data bases. (Maintain previous data and add new data.)	_____	☐ ☐ ☐	☐ ☐ ☐
h. Central library. (Central service library that many "subscribers" access.)	_____	☐ ☐ ☐	☐ ☐ ☐
i. Protected data base. (Data base needing protection from update.)	_____	☐ ☐ ☐	☐ ☐ ☐

Application	Importance (On a 0-10 scale 10 = very important)	Degree of criticality of performance parameter	
		Transfer Rate	Access Time
		H M L	H M L
2. • ON-LINE TAPE LIBRARY (Storage of sequential data that would normally be on tape.)	_____	☐ ☐ ☐	☐ ☐ ☐
3. • READ ONLY LIBRARY (Reference data such as program libraries.)	_____	☐ ☐ ☐	☐ ☐ ☐
4. • BACKUP (Disk backup data or duplicate copies.)	_____	☐ ☐ ☐	☐ ☐ ☐
5. • ARCHIVE (Data no longer needed for access but needing to be retained for legal or other reasons.)	_____	☐ ☐ ☐	☐ ☐ ☐
6. • CONTROLLED SPACE MANAGEMENT (Assign user controlled units of storage: A unit of storage is rewritten in its entirety whenever an update is made within that unit.)	_____	☐ ☐ ☐	☐ ☐ ☐
7. • BACKSTORAGE (Managed backstorage with automatic mounting of optical disks.)	_____	☐ ☐ ☐	☐ ☐ ☐
8. • MICROFILM REPLACEMENT/IMAGE PROCESSING (Optical disk storage for output to CRT for requested display.)	_____	☐ ☐ ☐	☐ ☐ ☐
9. • JOURNALING	_____	☐ ☐ ☐	☐ ☐ ☐

11. Would the absence of a visible move by IBM in the direction of optical storage impact your decision to use OSP?

_____ Yes

_____ No

Why? _____

_____

_____

12. Please check any of the following characteristics a vendor must have before you would consider using the product.

Rank all items checked	Check item	
_____	_____	Established vendor in EDP industry
_____	_____	Proven field support organization
_____	_____	Reputation as innovator of technology
_____	_____	Must be a mainframe supplier
_____	_____	Must have already done business with vendor
_____	_____	Other (Specify) _____

13. Please name any vendors you feel have these characteristics.

_____

_____

_____

_____

14. Please indicate how the amount of media used would be impacted as a function of the price of the media. ($50 is nominal price)

Media Price (per platter)	Effect on Media usage: Significantly Increase	No Impact	Significantly Decrease
$150	_____	_____	_____
$100	_____	_____	_____
$ 75	_____	_____	_____
$ 25	_____	_____	_____

15. Would the archive library product ("jukebox") be of interest to you?

_____ Yes

_____ No

a. Why? _____

_____

_____

b. Would it primarily be used for new applications or to replace existing devices?

____ Existing devices

_____New applications

c. If for new applications, which ones?

1. _____

2. _____

3. _____

4. _____

Thank You!

CATALOG NO. ☐☐☐☐☐☐

Application	Importance (On a 1-10 scale 10 = very important)	Degree of criticality of performance parameter	
		Transfer Rate	Access Time